

THAT WHICH IS CLAIMED:

1. An apparatus for collecting solar energy, the apparatus comprising:
a receiver extending along an axis and defining a passage for receiving a heat
5 transfer fluid;
a concave mirror configured to reflect solar radiation toward the receiver; and
an optical lens positioned adjacent the mirror, the lens being configured to
direct solar radiation toward the receiver,
wherein the mirror and lens are configured to direct different amounts of solar
10 radiation toward the receiver and thereby heat the receiver at first and second rates,
respectively, during similar solar conditions.
2. An apparatus according to Claim 1 wherein the mirror is parabolic and
configured to reflect solar energy toward the receiver.
- 15 3. An apparatus according to Claim 1 wherein the mirror is rotatable about the
axis of the receiver such that the mirror can receive solar radiation from various
directions and direct the solar radiation toward the receiver.
- 20 4. An apparatus according to Claim 1 wherein the lens is adjustable relative to
the mirror.
5. An apparatus according to Claim 1 wherein the lens and mirror are rigidly
attached.
- 25 6. An apparatus according to Claim 1 wherein the lens is a fresnel lens structured
to at least partially refract light passing therethrough.
7. An apparatus for collecting solar energy, the apparatus comprising:
30 a receiver extending along an axis and defining a passage for receiving a heat
transfer fluid; and
a first mirror being concave and configured to reflect solar radiation toward
the receiver; and

a second mirror positioned adjacent the first mirror, the second mirror being configured to direct solar radiation toward the receiver,

wherein the first and second mirrors are configured to direct different amounts of solar radiation toward the receiver and thereby heat the receiver at first and second
5 rates, respectively, during similar solar conditions.

8. An apparatus according to Claim 7 wherein the first mirror is parabolic and configured to reflect solar energy toward the receiver.

10 9. An apparatus according to Claim 7 wherein the first mirror is rotatable about the axis of the receiver such that the mirror can receive solar radiation from various directions and direct the solar radiation toward the receiver.

10. An apparatus according to Claim 7 wherein the first and second mirrors are
15 rigidly attached.

11. An apparatus according to Claim 7 wherein the second mirror is parabolic.

12. An apparatus for collecting solar energy, the apparatus comprising:
20 a receiver defining a passage for receiving a heat transfer fluid; and
a lens extending generally parallel with the linear receiver, the apparatus being adjustable between first and second positions, the lens in the first position being configured to direct solar radiation toward the receiver to thereby heat the heat transfer fluid in the passage at a first rate, and the lens in the second position being
25 configured to direct a lesser amount of solar radiation toward the receiver than in the first position to thereby heat the receiver at a second rate less than the first rate, during similar solar conditions.

13. An apparatus according to Claim 12 wherein the lens is fixedly positioned and
30 configured to direct solar radiation from a plurality of directions toward the receiver.

14. An apparatus according to Claim 13 wherein the lens extends at least about 170° around the receiver.

15. An apparatus according to Claim 12 further comprising a shade being adjustable between at least two positions to control an amount of solar radiation received by the receiver and thereby control the amount of heating of the receiver, the shade in at least one of the positions at least partially preventing the reception of solar radiation that would otherwise be incident upon the lens.

16. An apparatus according to Claim 12 wherein the lens is rotatable about a longitudinal axis of the receiver such that the lens can direct solar energy from the sun toward the receiver throughout a range of relative positions of the sun.

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17. An apparatus according to Claim 12 wherein the lens is a fresnel lens structured to at least partially refract light passing therethrough.

18. A method of heating a heat transfer fluid using solar energy, the method comprising:

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circulating a heat transfer fluid through a receiver defining a passage for receiving the heat transfer fluid;

adjusting a solar collection apparatus to a first position in which a mirror is configured to reflect solar radiation toward the receiver to thereby heat the receiver at a first rate; and

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adjusting the solar collection apparatus to a second position in which an optical lens of the apparatus positioned adjacent the mirror is configured to direct solar radiation toward the receiver, to thereby heat the receiver at a second rate.

19. A method according to Claim 18 wherein said first adjusting step comprises rotating the mirror about the receiver according to a relative position of the sun such that the mirror reflects solar radiation from the sun toward the receiver.

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20. A method according to Claim 18 wherein said second adjusting step comprises adjusting the lens relative to the mirror according to a relative position of the sun such that the lens directs solar radiation from the sun toward the receiver.

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21. A method according to Claim 18 wherein said second adjusting step comprises adjusting both the mirror and the lens, the lens being rigidly attached to the mirror.

22. A method according to Claim 18 wherein said second adjusting step comprises directing solar radiation onto the receiver in a substantially empty condition such that the receiver is heated to a preheat temperature before the fluid is circulated
5 therethrough.
23. A method according to Claim 18 wherein said second adjusting step comprises directing solar radiation onto the receiver with the heat transfer fluid at least partially solidified therein such that the heat transfer fluid is melted.
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24. A method according to Claim 18 wherein said circulating step comprises circulating a molten salt.
25. A method according to Claim 18 further comprising delivering the heat
15 transfer fluid to a power generator.
26. A method of heating a heat transfer fluid using solar energy, the method comprising:
circulating a heat transfer fluid through a receiver defining a passage for
20 receiving the heat transfer fluid;
adjusting a solar collection apparatus to a first position in which a first mirror of the apparatus is configured to reflect solar radiation toward the receiver to thereby heat the receiver at a first rate; and
adjusting the solar collection apparatus to a second position in which a second
25 mirror of the apparatus positioned adjacent the first mirror is configured to reflect solar radiation toward the receiver to thereby heat the receiver at a second rate.
27. A method according to Claim 26 wherein said first adjusting step comprises rotating the first mirror about the receiver according to a relative position of the sun
30 such that the first mirror reflects solar radiation from the sun toward the receiver.
28. A method according to Claim 26 wherein said second adjusting step comprises adjusting the second mirror relative to the first mirror and according to a relative

position of the sun such that the second mirror reflects solar radiation from the sun toward the receiver.

29. A method according to Claim 26 wherein said second adjusting step comprises
5 adjusting both the first and second mirrors according to a relative position of the sun such that the second mirror reflects solar radiation from the sun toward the receiver, the first and second mirrors being rigidly attached.

30. A method according to Claim 26 wherein said second adjusting step comprises
10 reflecting solar radiation onto the receiver in a substantially empty condition such that the receiver is heated to a preheat temperature before the fluid is circulated therethrough.

31. A method according to Claim 26 wherein said second adjusting step comprises
15 directing solar radiation onto the receiver with the heat transfer fluid at least partially solidified therein such that the heat transfer fluid is melted.

32. A method according to Claim 26 wherein said circulating step comprises
20 circulating a molten salt.

33. A method according to Claim 26 further comprising delivering the heat
transfer fluid to a power generator.

34. A method of heating a heat transfer fluid using solar energy, the method
25 comprising:

circulating a heat transfer fluid through a receiver defining a passage for
receiving the heat transfer fluid;

adjusting a solar collection apparatus having a lens to a first position in which
the lens is configured to refract solar radiation toward the receiver and heat the heat
30 transfer fluid therein; and

adjusting the solar collection apparatus to a second position in which the lens
is configured to refract a second amount of solar radiation toward the receiver, the
lens refracting less solar radiation toward the receiver in the second position than in
the first position.

35. A method according to Claim 34 wherein said first and second adjusting steps comprise rotating the lens about the receiver according to a relative position of the sun such that the lens refracts solar radiation from the sun toward the receiver.

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36. A method according to Claim 34 wherein said second adjusting step comprises refracting solar radiation onto the receiver in a substantially empty condition such that the receiver is heated to a preheat temperature before the fluid is circulated therethrough.

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37. A method according to Claim 34 wherein said second adjusting step comprises refracting solar radiation onto the receiver with the heat transfer fluid at least partially solidified therein such that the heat transfer fluid is melted.

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38. A method according to Claim 34 wherein said first and second adjusting steps comprise adjusting a shade device of the apparatus to control an amount of solar radiation received by the receiver and thereby control the amount of heating of the receiver, the shade in at least one of the positions at least partially preventing the reception of solar radiation that would otherwise be incident upon the lens.

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39. A method according to Claim 34 wherein said circulating step comprises circulating a molten salt.

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40. A method according to Claim 34 further comprising delivering the heat transfer fluid to a power generator.